Scientific Uncertainty

Critics of efforts to contain global warming often argue that the science is "uncertain." Of course all science is "uncertain" in that it is subject to challenge by new evidence or interpretation. The "scientific method" requires that challenges to an assertion or hypothesis must be based on data and analysis that are peer-reviewed and critically examined by other scholars with expertise in the same field to see if it stands up to scientific scrutiny.

We rely on the "greenhouse effect," a phenomenon not seriously disputed in any academic institutions, to maintain the habitability of the earth. This effect is the result of a layer of gases in the upper atmosphere that surrounds the earth. This necessary layer traps, as heat, some of the solar energy that enters the atmosphere, maintaining a temperature range within certain optimal limits that sustains life on the planet as we know it. Without this effect, scientists estimate that temperatures would be over 50 degrees F. cooler, too cold to be habitable. Conversely, too thick a "blanket" of these greenhouse gases can overheat the surface of the earth and affect habitability.

Skeptics of global warming sometimes imply that "uncertainty" is the same as a 50/50 possibility that global warming is either occurring or not. Even if this were true, a 50% chance that the world would see some of the likely impacts scientists are forecasting would merit a determined response. But the inference is both misleading and untrue.

An overwhelming majority of the world's climate scientists are finding a causal link between growing concentrations of CO_2 and other greenhouse gases generated from human activity (fossil fuel and other sources) and a warming of the planet – beyond levels known to prevail in pre-industrial times. These scientists serve on the Intergovernmental Panel on Climate Change (IPCC), assembled by the United Nations from leading academic institutions around the globe.

Considerable uncertainty remains over the timing, distribution and potential severity of climate change on storm activity, sea level rise, forest health, water supplies, tropical disease propagation and other terrestrial effects. These effects could as easily be more severe, or occur more rapidly and abruptly, as less severe and slower to gather. As computer models become more refined, we can expect to understand in greater detail the timing and distribution of effects. What is clear, however, is that the more greenhouse gas concentrations accumulate, the more we will be affected by these changes.

Climate science asks that we apply probabilities to complex, long-term effects and adopt policies in response that must span decades. For example, Climate Change 2001: The Synthesis Report by the IPCC gives 66 percent to 90 percent confidence in data that show that there were higher maximum temperatures and more hot days over land areas in the latter half of the 20th century, but it has 90 percent to 99 percent confidence that the globe will see such changes during the 21st century. It also has 90 percent to 99 percent confidence that there were and will be higher minimum temperatures, fewer cold days, fewer frost days, and a reduced range of temperature changes from day to night over land areas. We must learn to work with such probabilities, acknowledge both the evidence and the remaining uncertainty, and focus on solutions.